

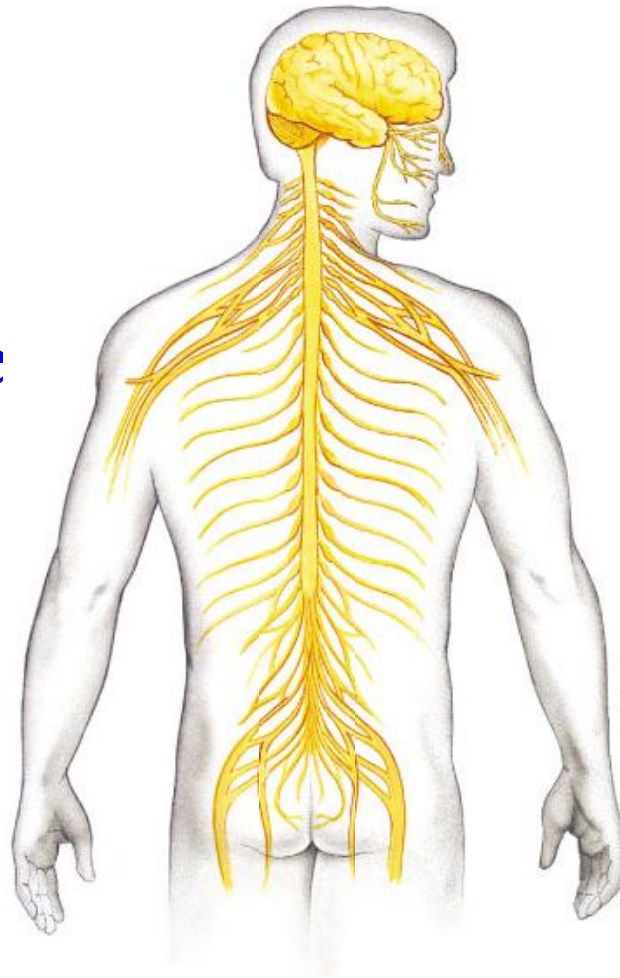
QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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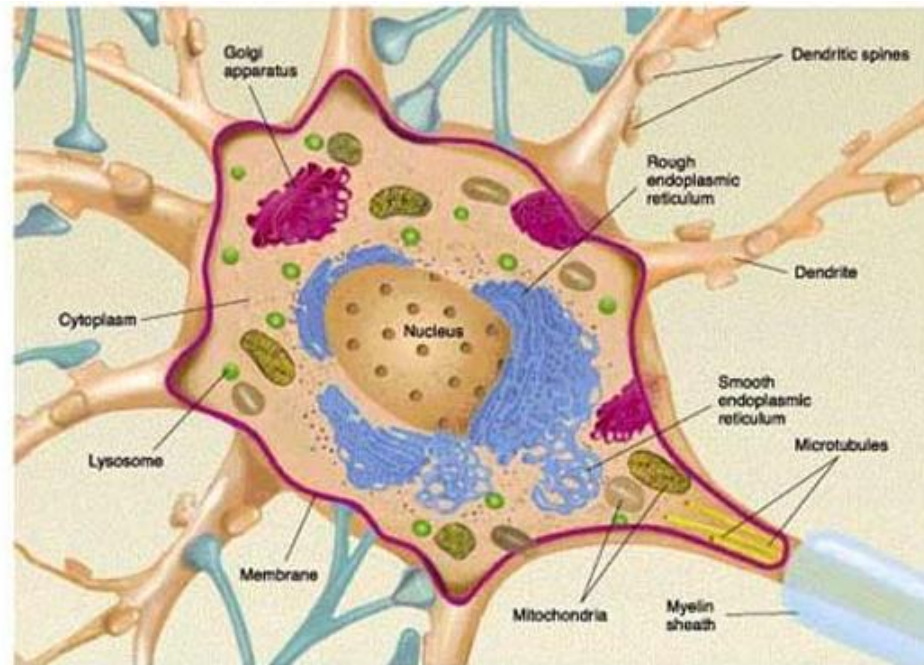
WHAT PARTS DO YOU KNOW THAT ARE IN THE NERVOUS SYSTEM?

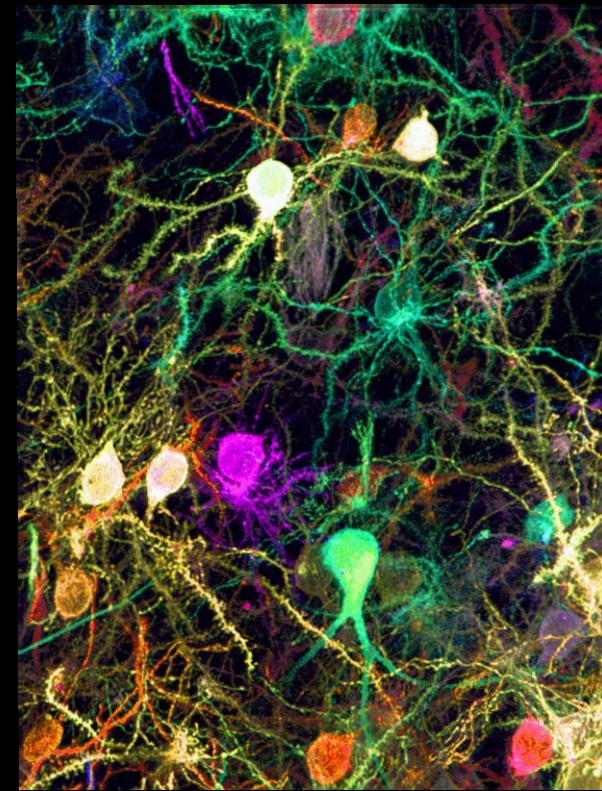
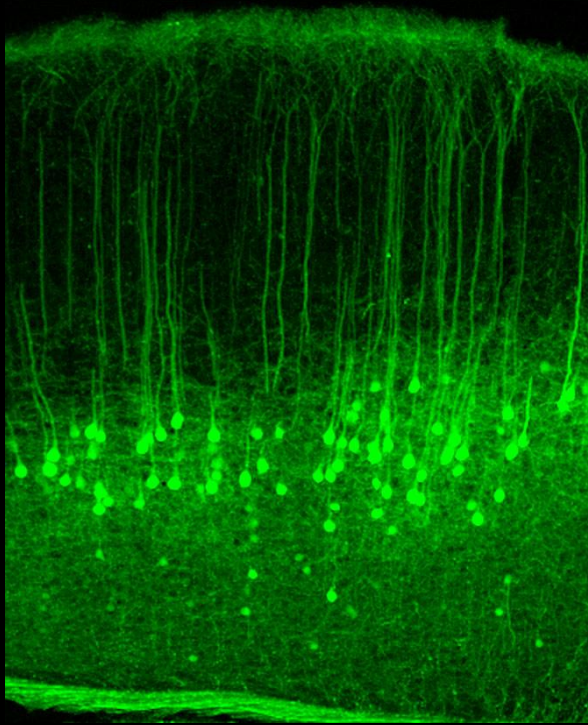
- Brain
- Spinal Cord
- Peripheral Nerve



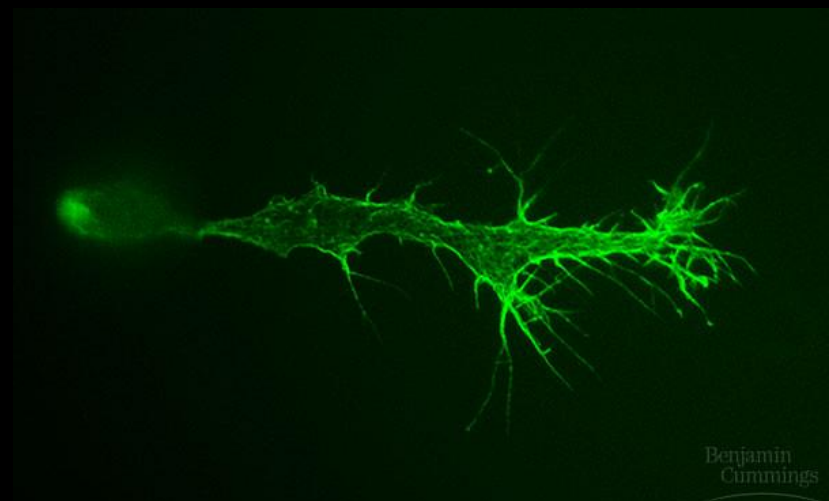
What makes up the brain, the spinal cord or your peripheral nerves?

- Neurons are “the cell”
- Cell body
- Nucleus
- Axon
- Dendrite
- What do you think surrounds the cell?
- What other organelles would be needed?



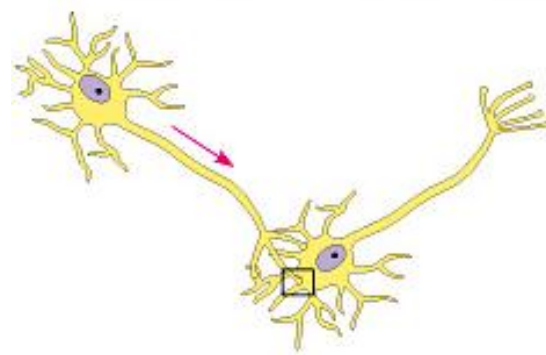
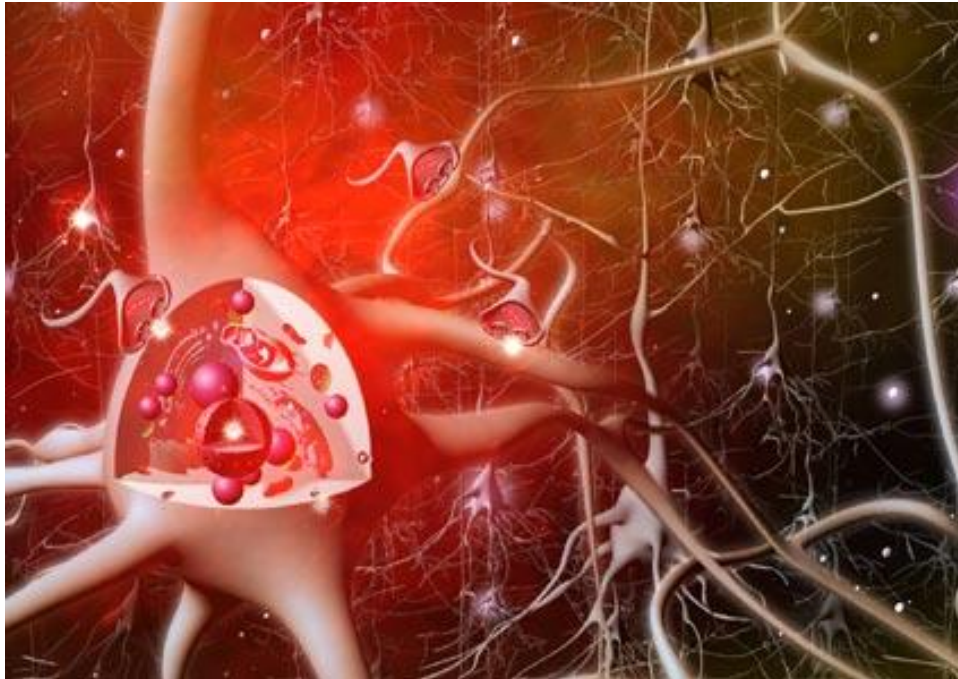


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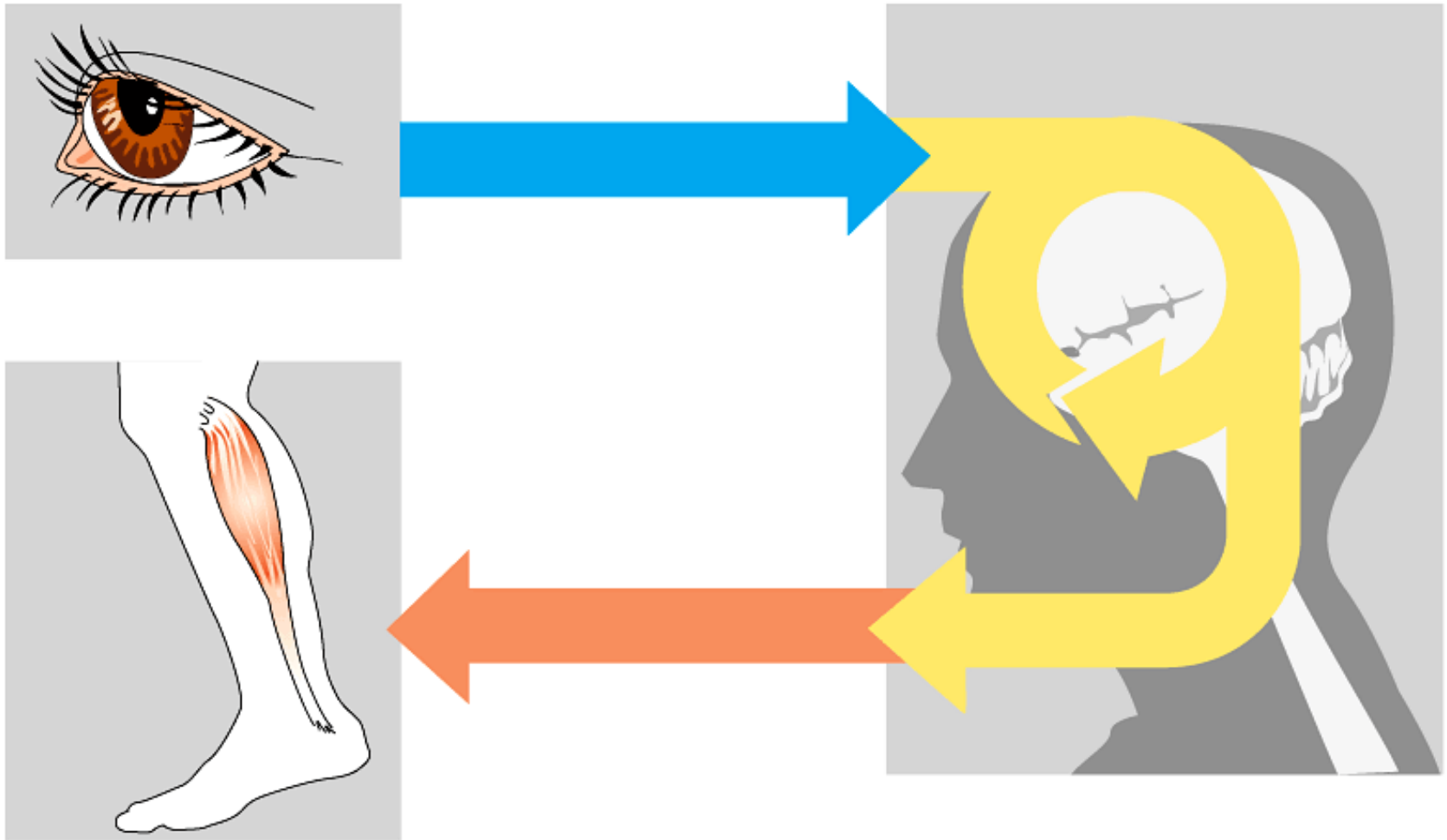


How are neurons connected?

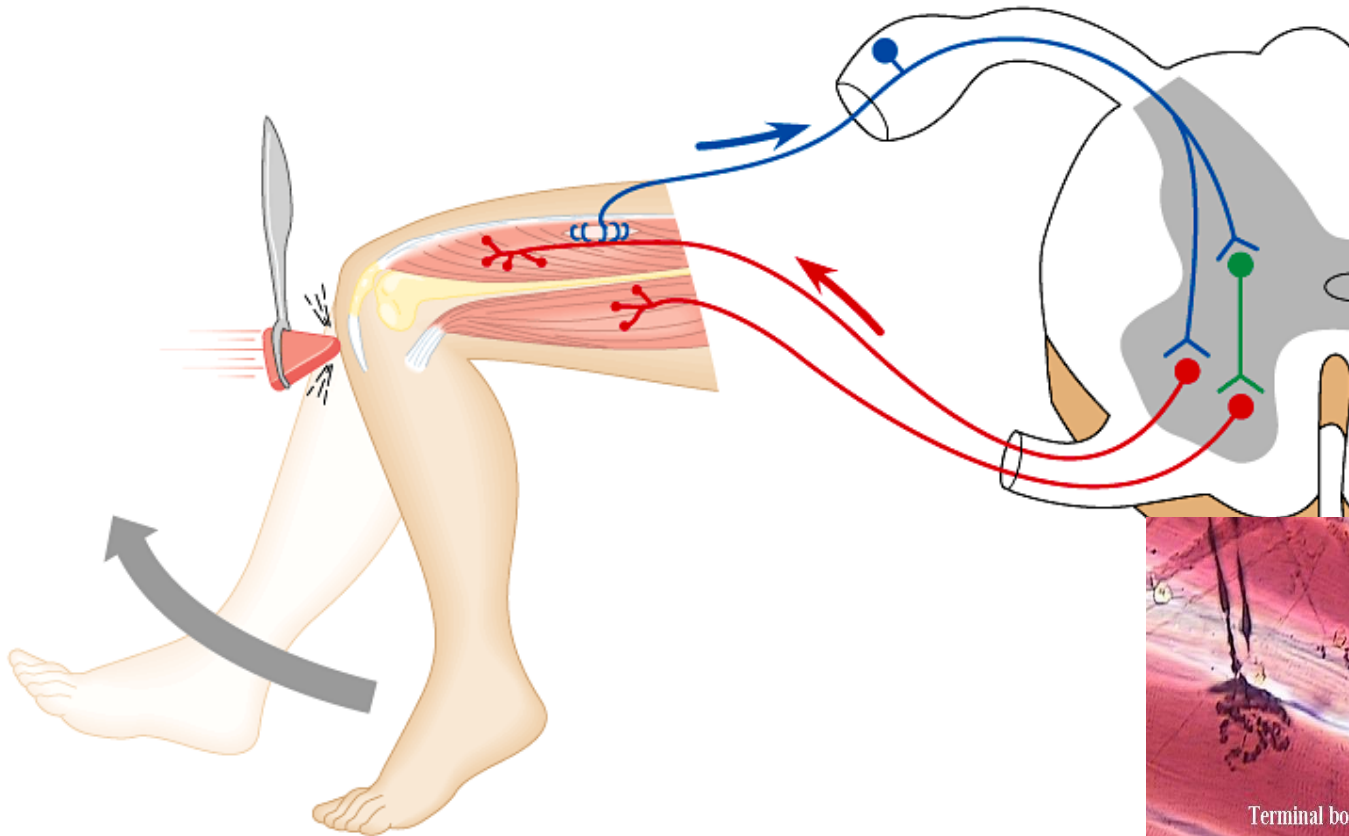
- Synapses!!



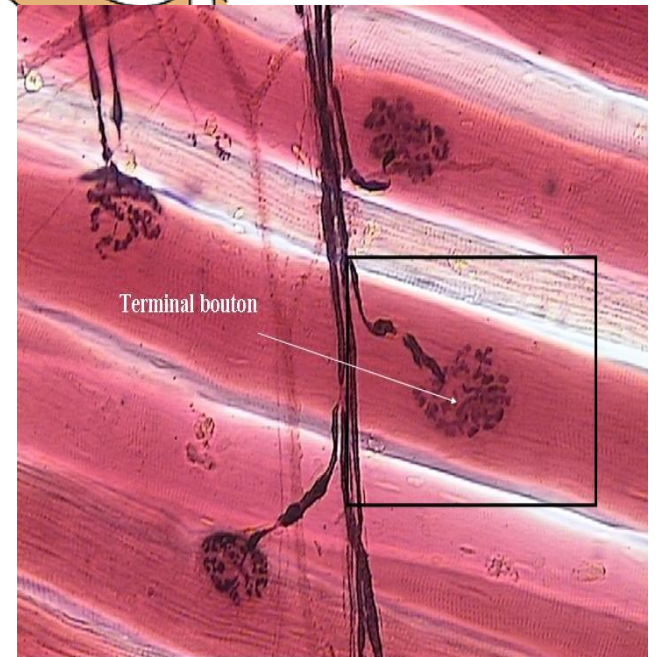
Why are neurons connected?



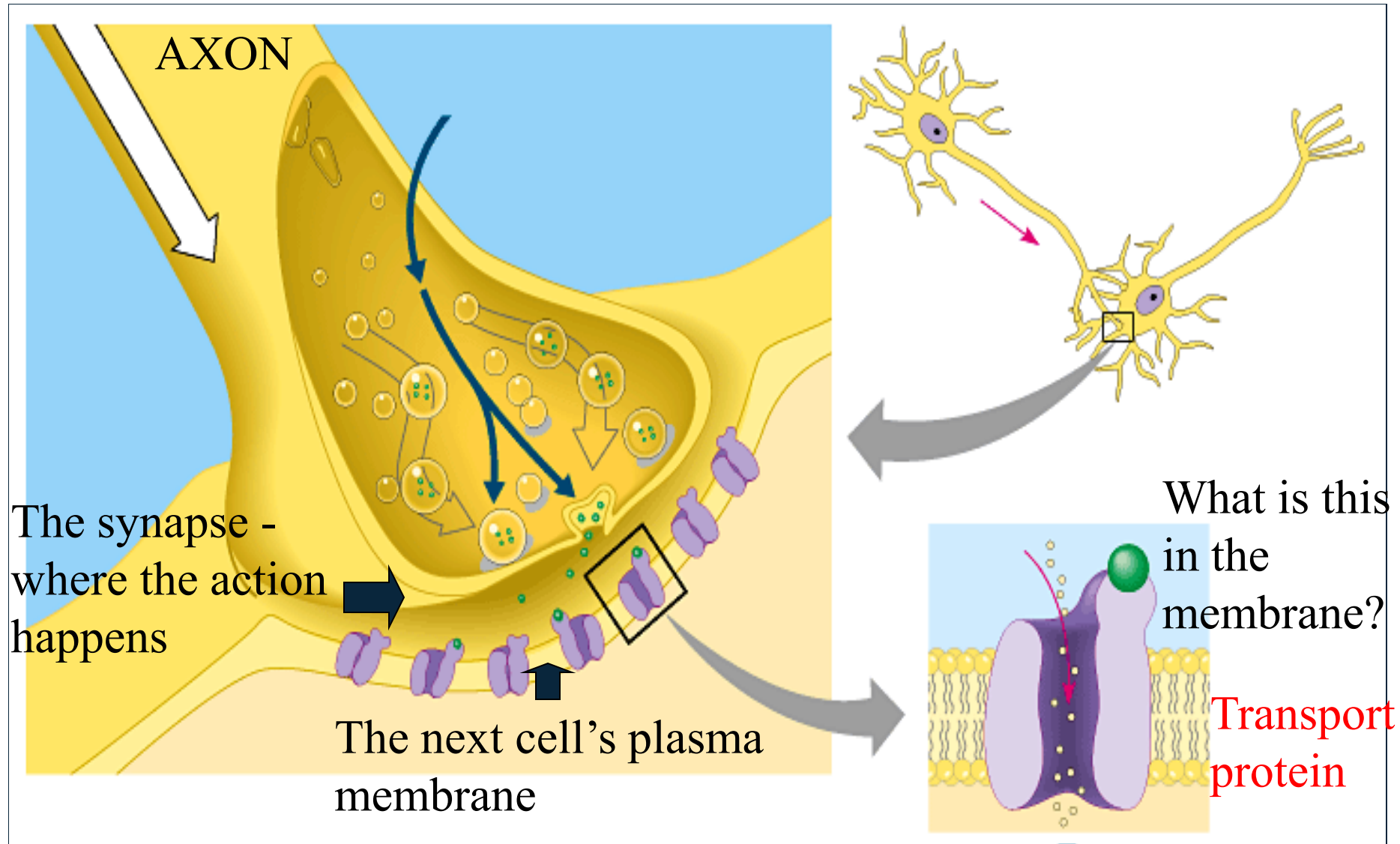
More neuron connections!



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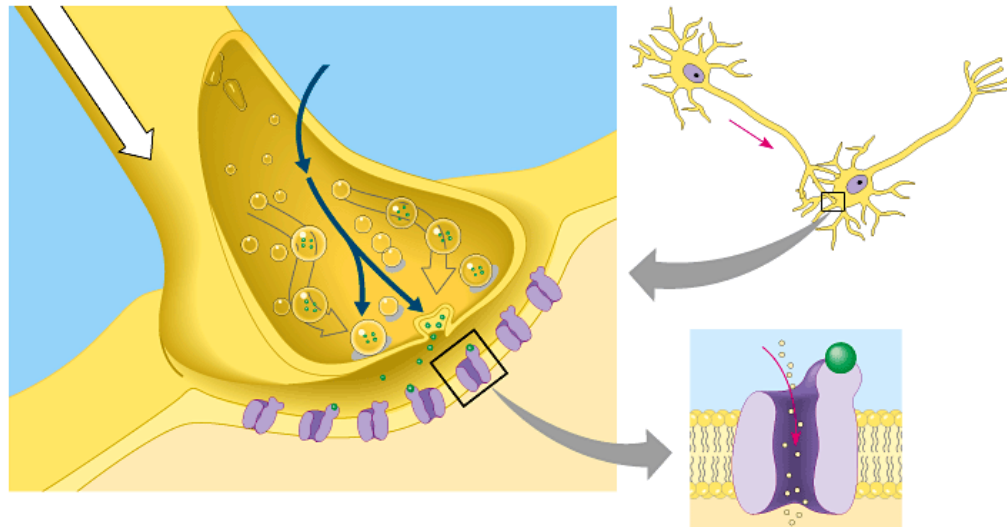


Close up look at your synapse

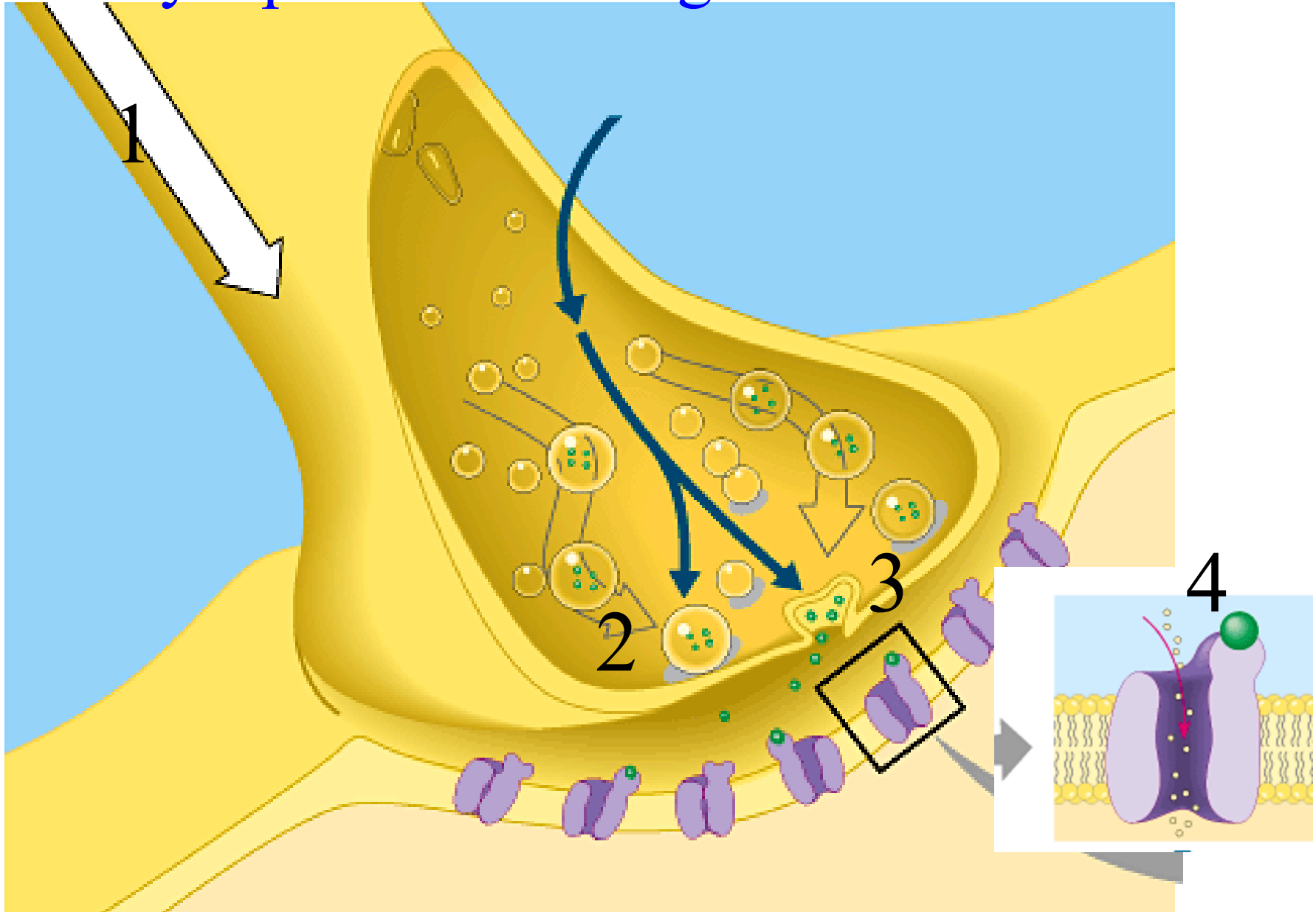


How does the Synapse carry the signal?

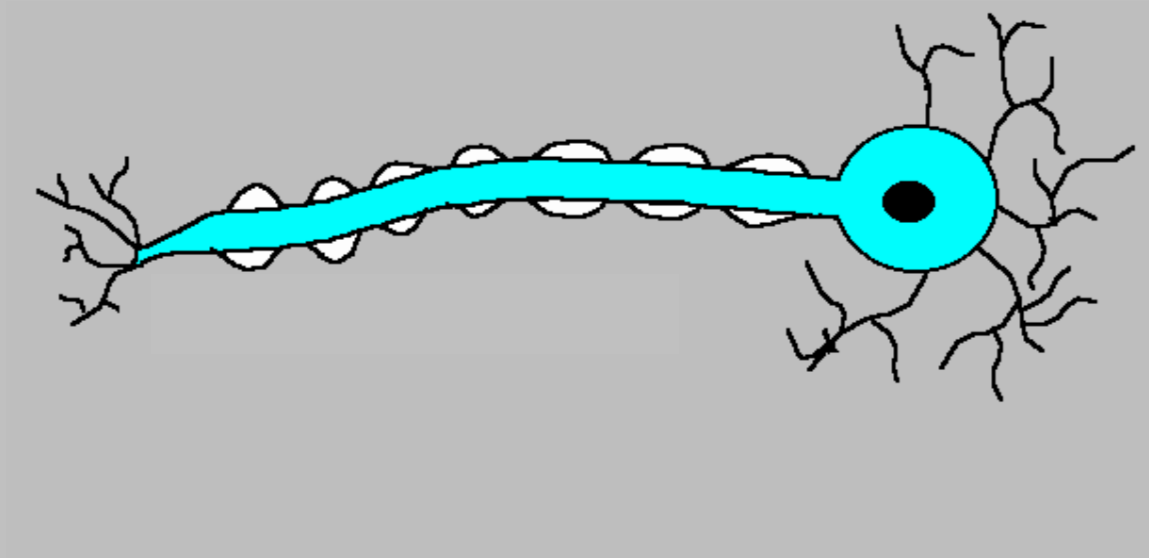
1. Electrical current travels down the axon
2. Vesicles with chemicals move toward the membrane - what is that called?
3. Chemicals are released and diffuse toward the next cell's plasma membrane
4. The chemicals open up the transport proteins and allow the signal to pass to the next cell - what type of diffusion is this?



The synapse carries a signal from cell to cell



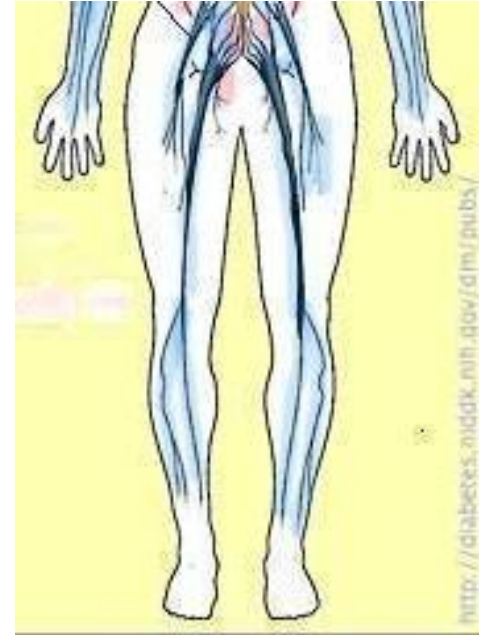
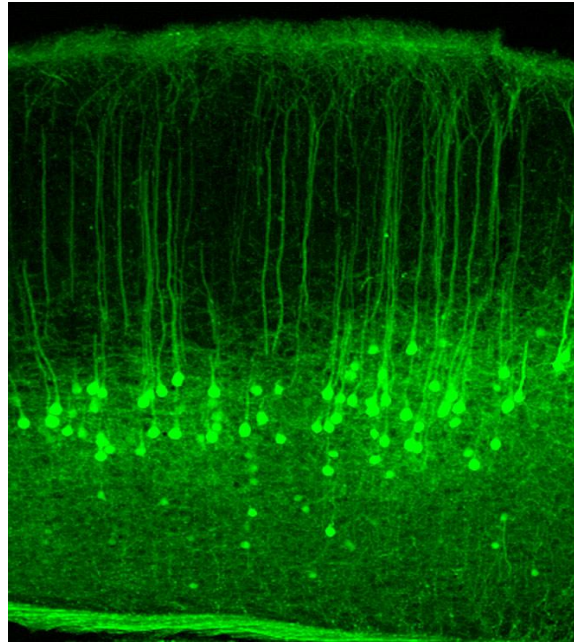
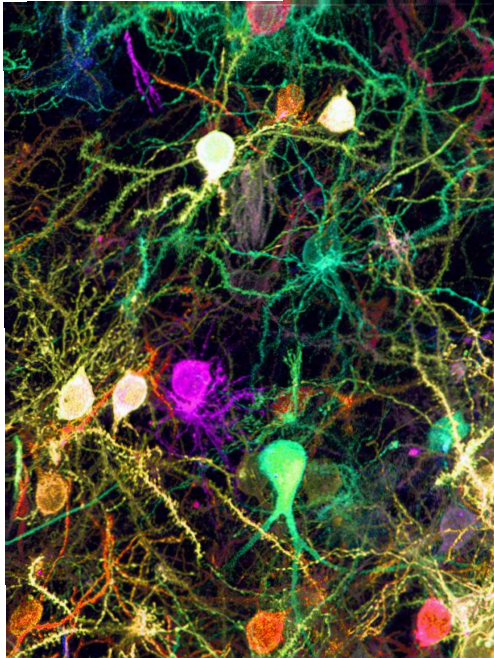
There are lots of proteins and chemicals in your body to do the work



Why is it important that it is an electrical current?

Are all neurons equal in size?

- Brain vs spinal cord vs peripheral nerves?



About how many neurons are in the human brain?

100 billion

About how many neurons are in the spinal cord?

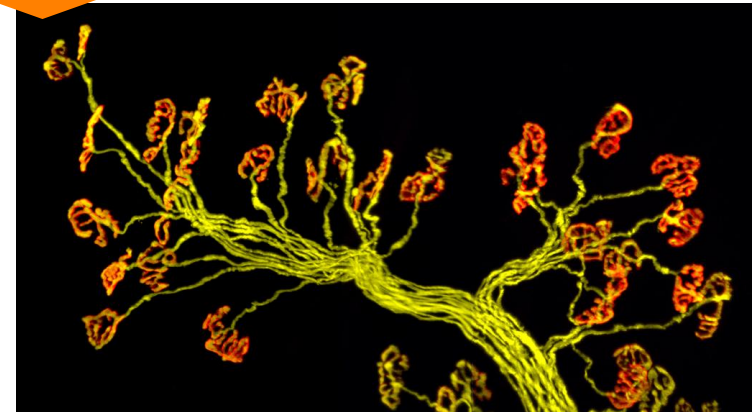
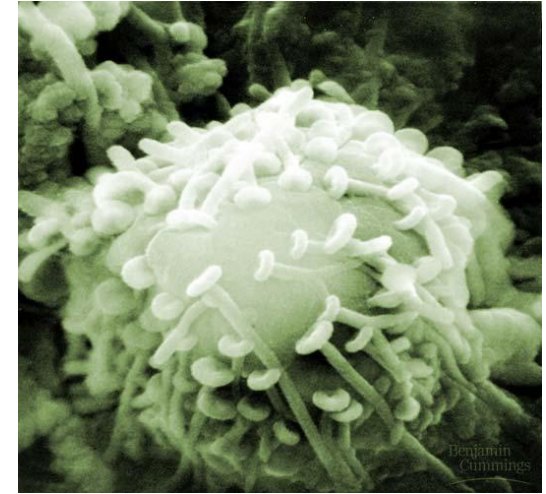
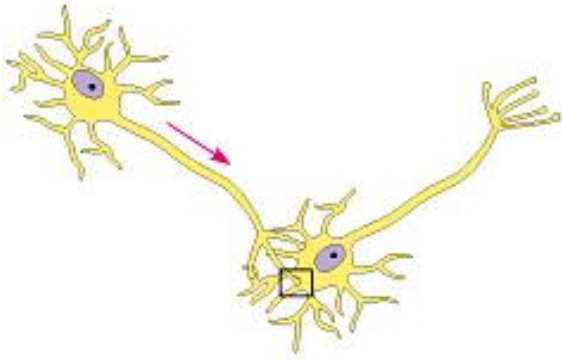
1 billion

How long do you think the longest axon in the world is?

around 15 feet

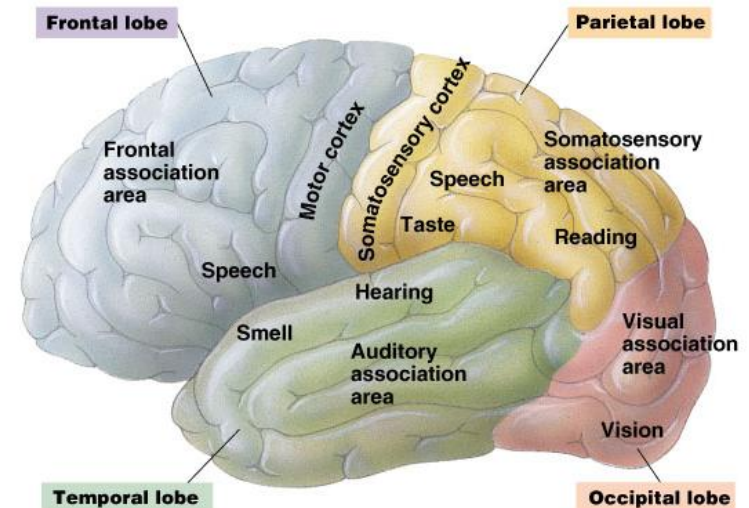
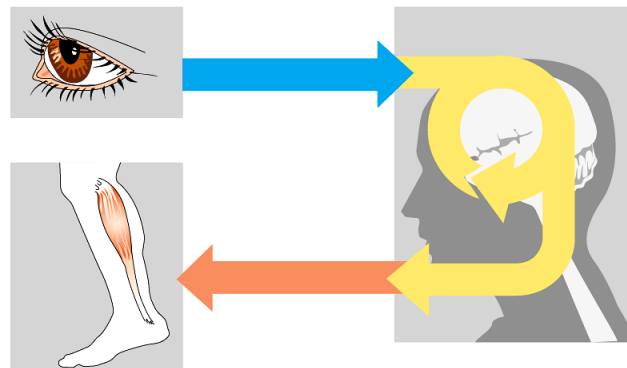
How many synapses are in one neuron?

1,000 to 10,000!!



This science is called Neurobiology

- Looking at the actual cells - how do they work?
- Looking at the connections - how and when do they work?
- Looking at what can change normal cells and connections
- Looking at diseases that occur in the brain
- One of the largest areas still unknown
- The you that is you is because of your neurons connecting!

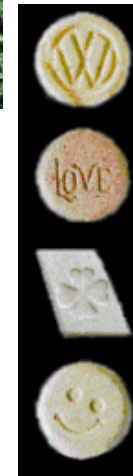
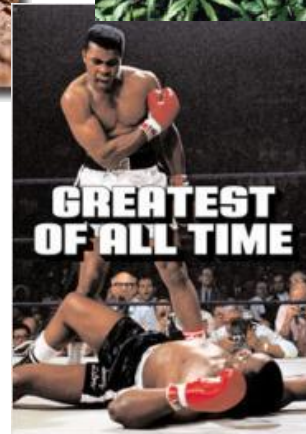
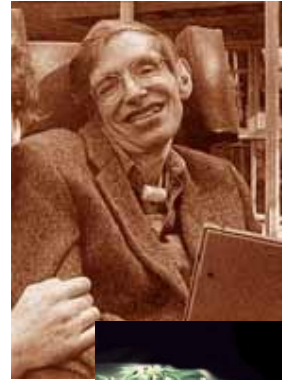


(b) Left side of brain

amin Cummings.

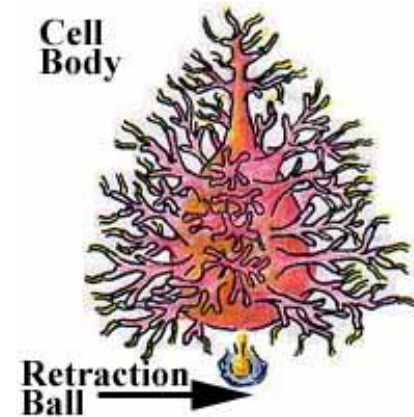
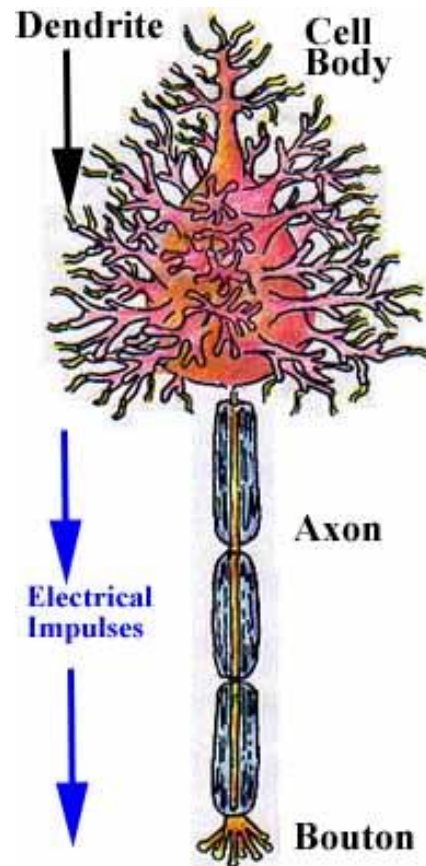
What do you think can change neurons and their connections?

- Accidents
- Drugs
- Alcohol
- Disease

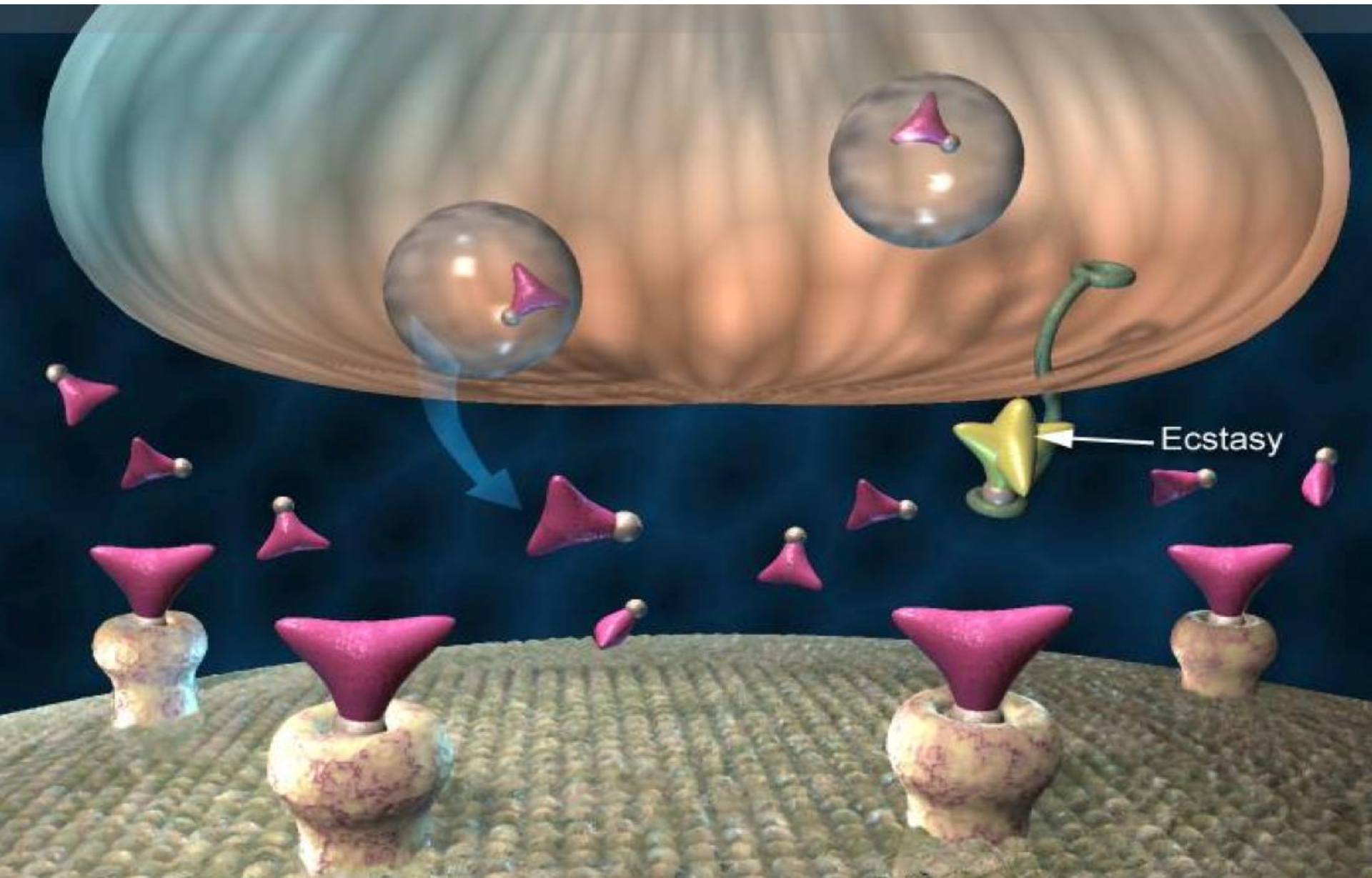


Accidents

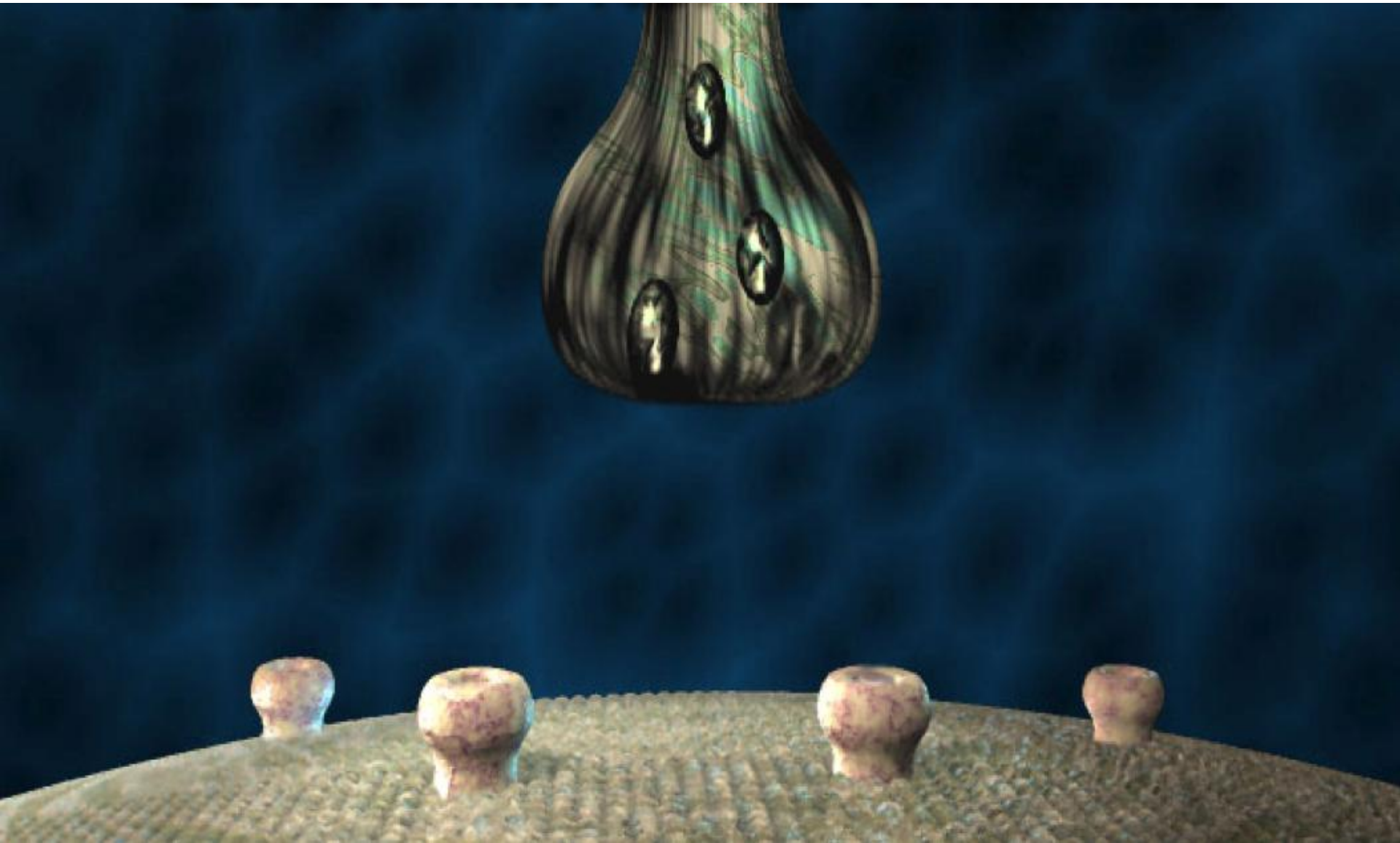
- Physical injury of your neurons



Drugs and alcohol bind important receptors on neurons

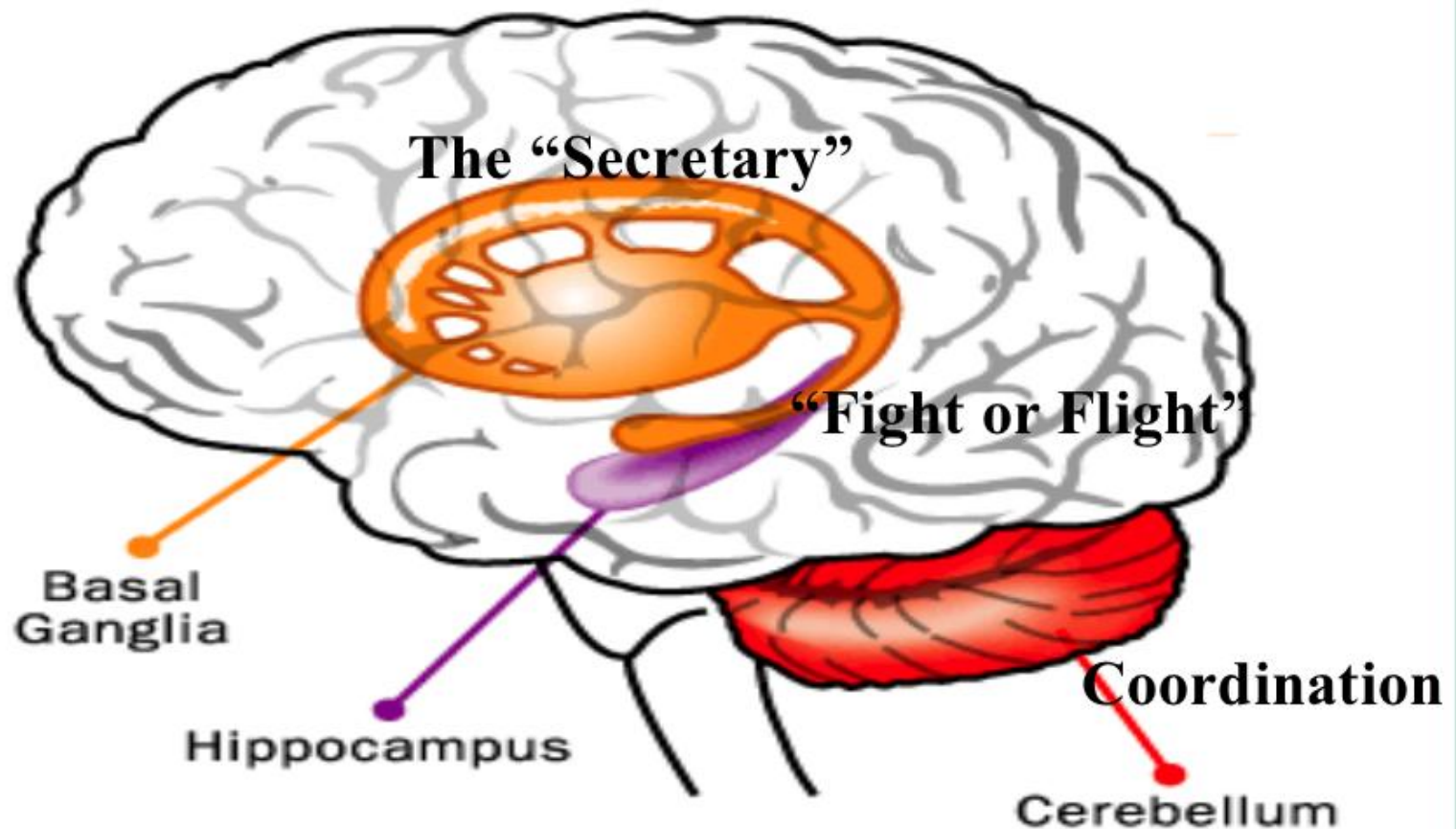


Repeated binding causes the neuron to die

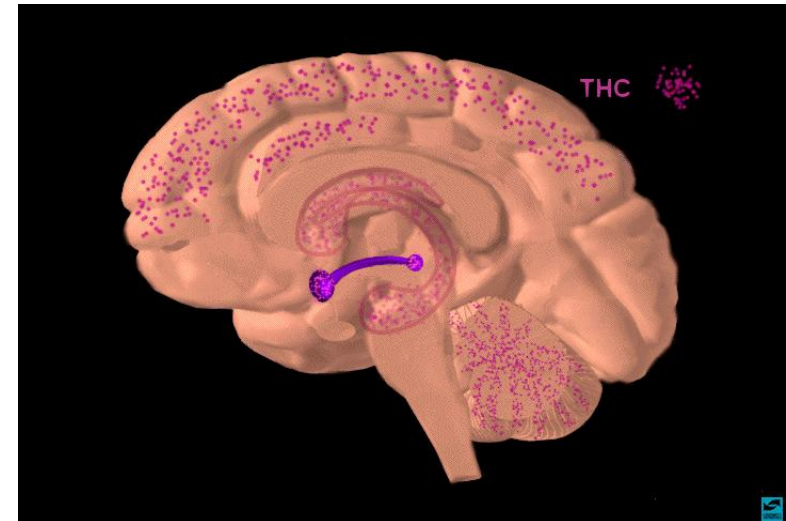
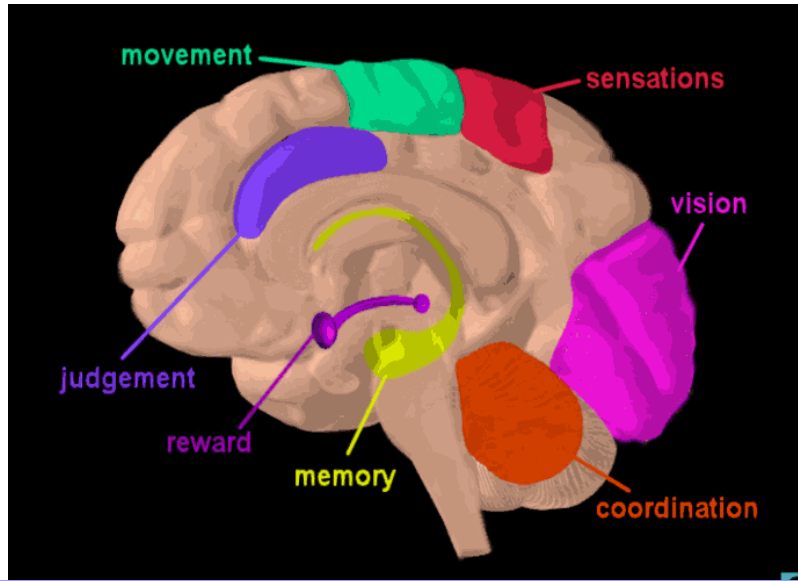
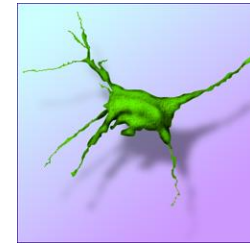


The Brain's Marijuana Receptor Sites

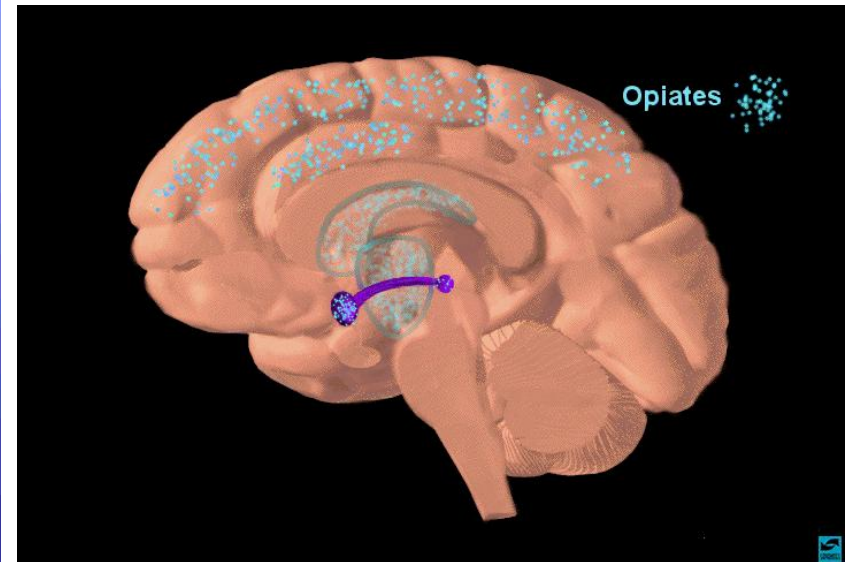
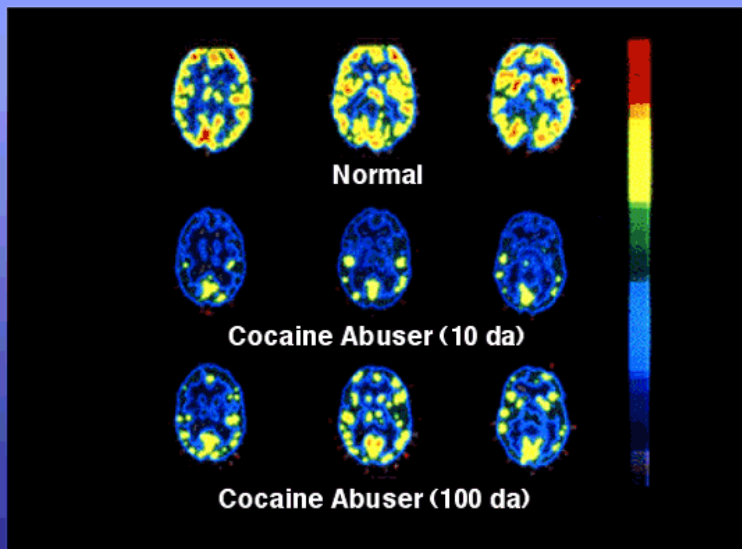
Cannabinoid Receptor Sites



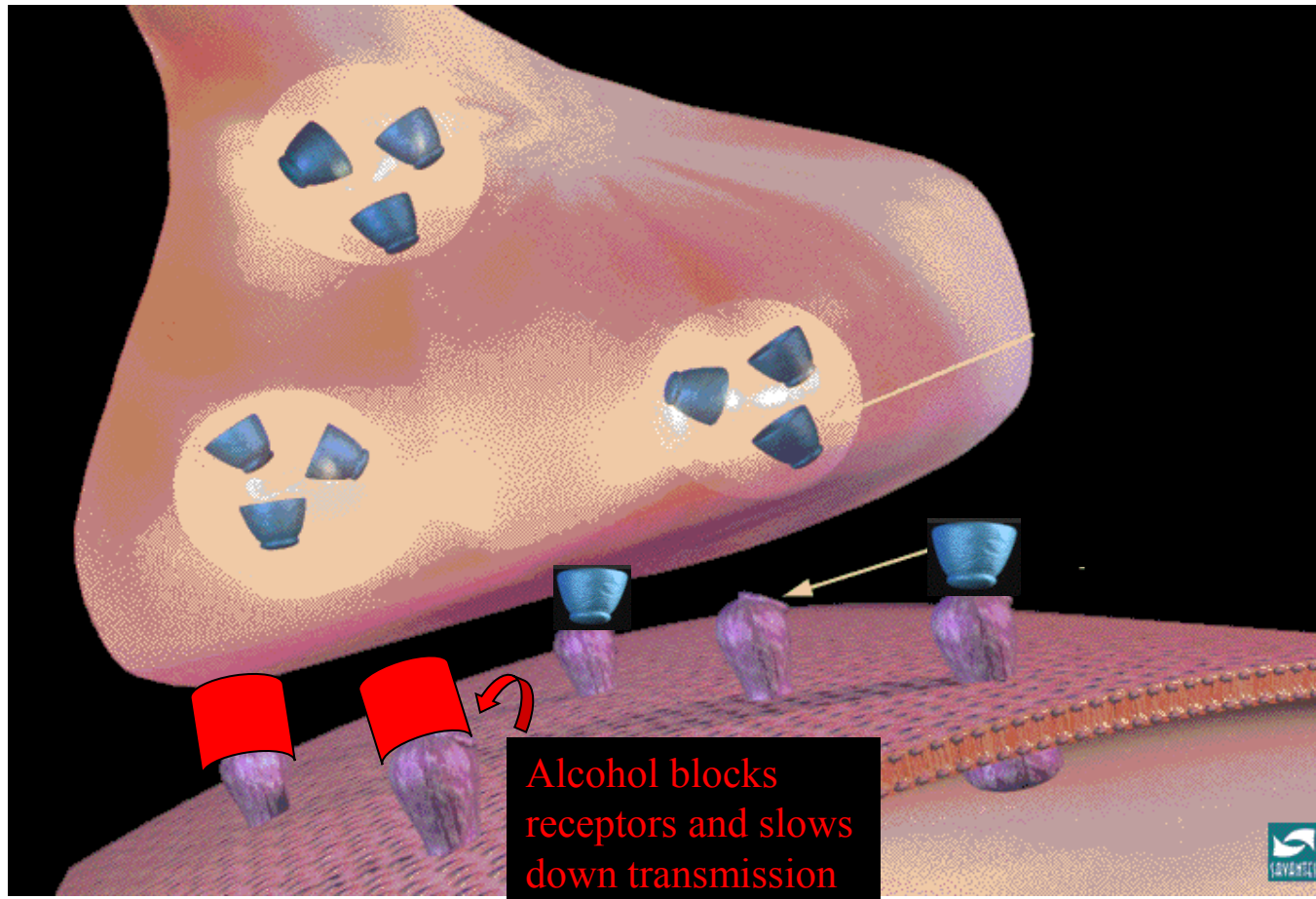
Drugs = neuron death



Your Brain After Drugs



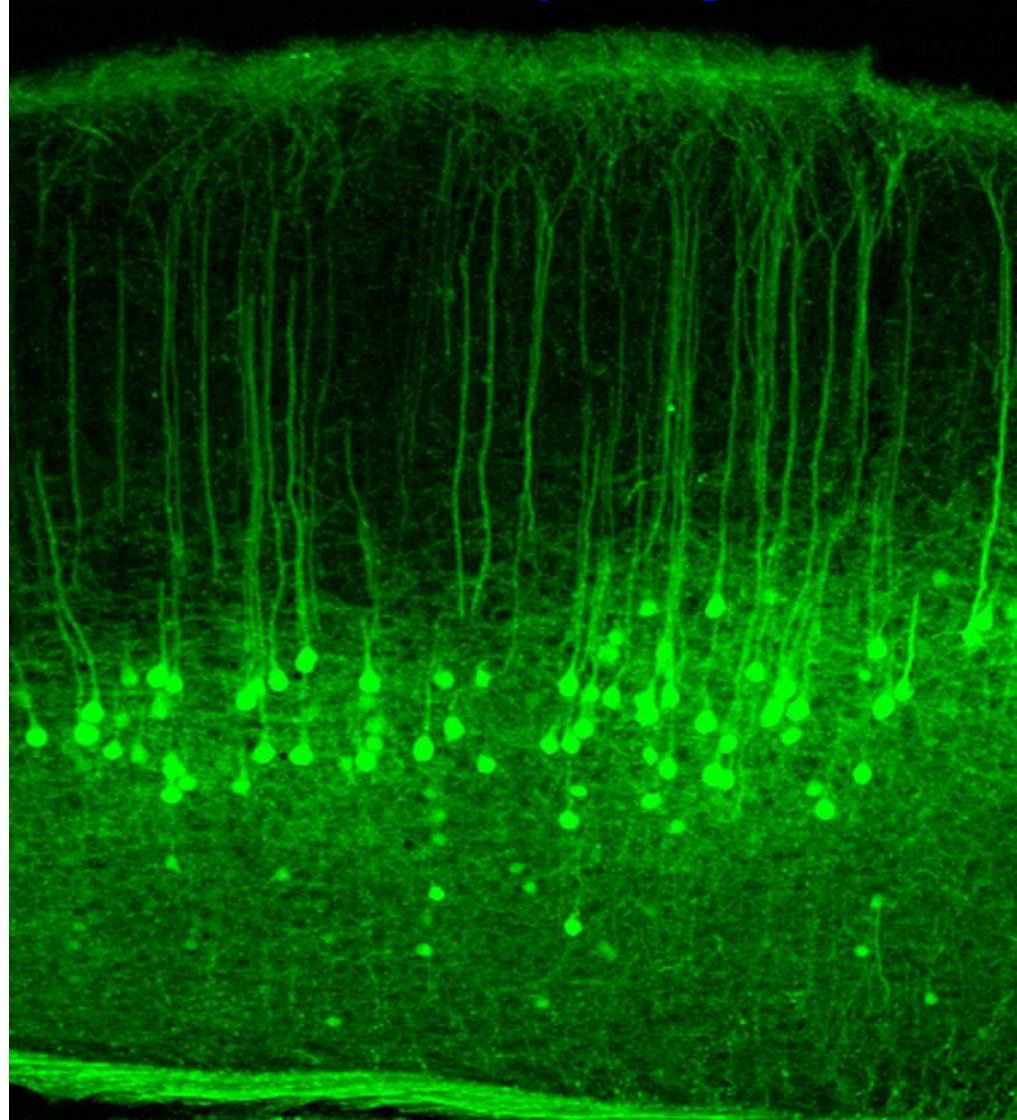
Alcohol damages dendrites - can repair after abstinence

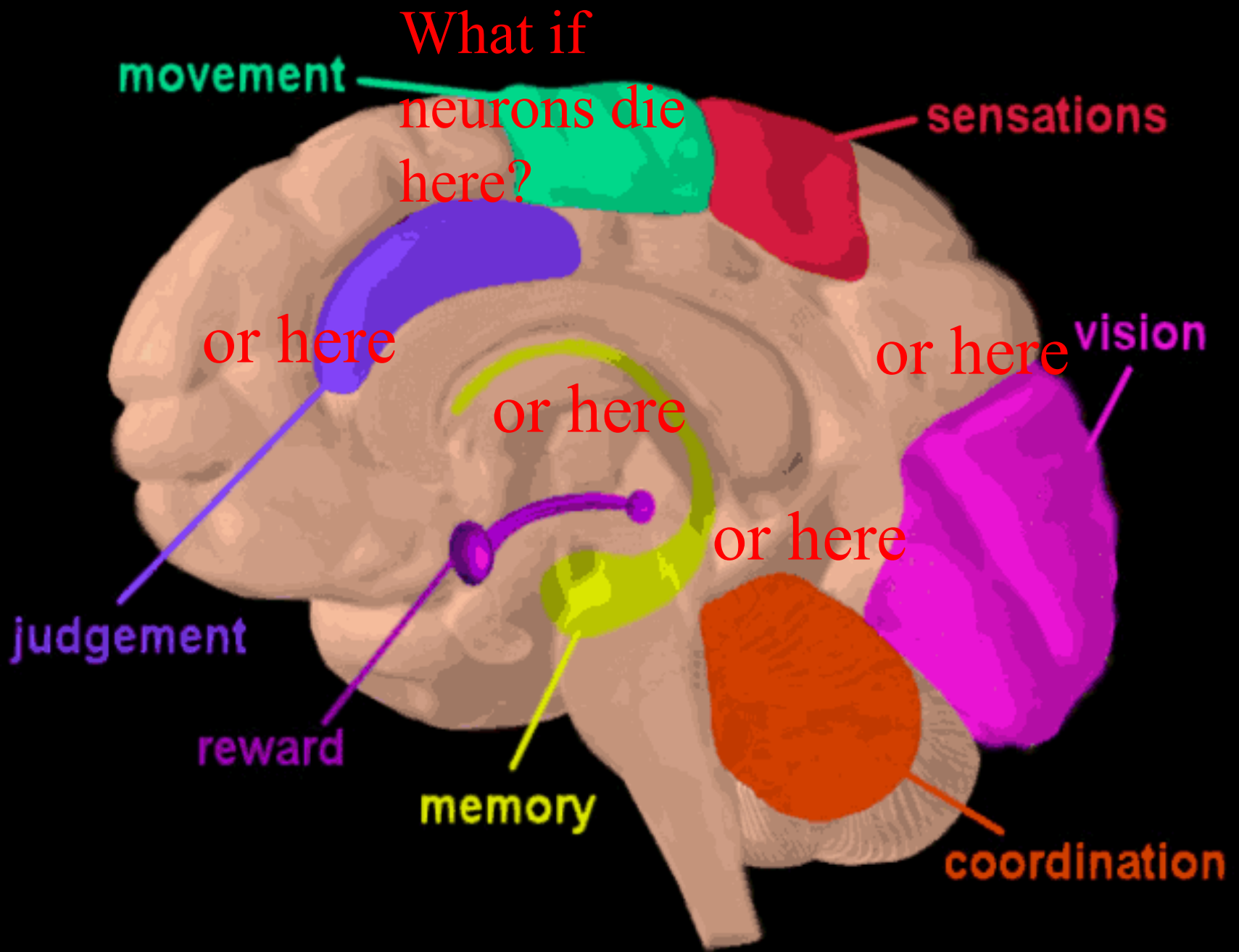


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- A complex, glowing yellow-green neural network or fiber-like structure is shown against a dark background. The structure consists of a main trunk that branches out into numerous smaller, intricate branches. Small, bright red nodes or clusters are distributed along these branches, particularly concentrated at the tips and in the more complex, bushy areas. The overall appearance is reminiscent of a microscopic view of neural tissue or a stylized representation of a neural network.
- Parkinson's Disease
 - ALS - Lou Gehrig's Disease
 - Huntington's Disease
 - Multiple Sclerosis
 - Alzheimer's
 - Cerebral Palsy
 - Epilepsy
 - ? SIDS

100 Billion or so neurons - what's the problem with some of them dying?

- Cells multiply all the time - will your neurons?
- Does everyone react the same way to accidents, or drugs and alcohol?
- Do all organisms react the same to all stimulus?
- Which of your activities use your neurons?





Neurobiology Activities and Labs

- What Does Your "Homunculus" Look Like?
(www.accessexcellence.org/AE/AEPC/WWC/1991/homunculus.html)
- Effect of Environment on Memory
(http://www.accessexcellence.org/AE/AEC/AEF/1996/brown_memory.html)
- Taste Activity
(http://yucky.kids.discovery.com/flash/fun_n_games/activities/experiments/experiment_truly_tasteless.html)
- A healthy brain? - Caffeine activity
(http://www.pfizer.com/brain/teachers_html.html)
- Pillbug behavior Lab - (<http://www.udel.edu/msmith/pillbugs.html>)

REFERENCES

- <http://faculty.washington.edu/chudler/facts.html>
- <http://occawlonline.pearsoned.com/bookbind/pubbooks/campbell6eawl/chapter0/deluxe.html>
- JOSHANES.PPT
- www.familyties.org/presentations/The%20Neurobiology%20of%20Adolescent%20Substance%20Abuse%20II.ppt
- http://www.nsbri.org/Education/High_Act.html
- http://www.pfizer.com/brain/teachers_html.html
- <http://www.research.buffalo.edu/quarterly/vol10/num01/n1.shtml>
- <http://www.aim-digest.com/gateway/pages/brain/articles/myths.htm>
- <http://www.nida.nih.gov/pubs/teaching/Teaching5/Teaching3.html>
- <http://www.accessexcellence.com/AE/>
- <http://psych.colorado.edu/~kenth/Image14.gif>